APPENDIX A: CONVERSION FACTORS AND OTHER USEFUL INFORMATION

I. CONVERSION FACTORS

One microgram = 1 µg = 1 x 10^{-6} g = 1000 ng

One nanogram = 1 ng = 1 x 10^{-9} g = 1000 pg

One picogram = 1 pg = 1 x 10^{-12} g = 1 x 10^{-3} ng

One liter = 1 L = 1000 mL

One milliliter = 1 mL = 1 x 10^{-3} (0.001) L = 1000 µL

One microliter = 1 µL = 1 x 10^{-3} mL = 0.001 mL

II. CONCENTRATIONS

A. Concentration can be expressed several ways:

1. Weight percent = (mass A/total mass of solution) x 100

   or simplified: Wt $\%_A$ = (g_A/100 mL of solution) x 100

2. Volume percent = (volume A/total volume of solution) x 100

   or simplified: Volume $\%_A$ = ($volume_A$/100 mL of solution) x 100

3. Molarity (*M*): *M* = no. moles solute A/no. liters solution

   = molecular weight of solute A in 1000 mL solution

   where 1 mole of A = 1 gram formula weight of A

4. Normality (*N*) = no. MW/no. liters solution

   where in acid-base reactions:

   MW acid = weight of acid which reacts with 1 mole of OH^-
   MW base = weight of base which reacts with 1 mole of H^+

   The normality of a given reagent depends on the reaction in which it participates. (Example: 1 L of 1*M* H_3PO_4 which can have *N* = 1, 2 or 3 depending upon the reaction in which it is involved.) Because of ambiguities, the concept of normality is to be used carefully.

B. Examples:

1. Prepare 50% solution of polyethylene glycol (PEG):

   Place 50 g of PEG in a flask and bring to a volume of 100 mL with H_2O.

   Wt % PEG = (50 g/100 mL) x 100 = 50%

2. Prepare 100 mL of 2*M* HCl from a stock solution of 12*M* HCl. (The question is how much stock solution of 12*M* HCl is needed?)

   Conc of Stock Soln = C_s = 12*M* Conc of Final Soln = C_f = 2*M*

   Volume of Stock Soln = V_s = ? Volume of Final Soln = V_f = 0.1 L

   $C_s \bullet V_s = C_f \bullet V_f$

   $V_s = (C_f \bullet V_f)/C_s = 2(0.1)/12 = 0.2/12 = 0.0167$ L

   $V_s = 0.0167$ L = 16.7 mL

   Answer: Take 16.7 mL of 12*M* HCl and dilute to final volume of 100 mL to give 2*M* HCl.

♦**END**